Space Weather Forecast

Issued on Sunday 23 February 2025 at 12:23 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely. Possible glancing CMEs Days 1-2 (23-24 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate with three Moderate-class flares, peaking at 23/0213 UTC from a region which is now no longer visible on the west limb. As such the risk from here will ease over the next 24 hours. There are now ten sunspot regions on the visible disc. The most notable regions are in the southwest quadrant and in the northwest quadrant. The region in the southwest has shown spot development, increasing in penumbral area, with mixed magnetic polarities in the intermediate portion. The region in the northwest developed rapidly at first although this has now stalled, showing some slight decay in its intermediate spots. However, there remains clear magnetic complexity in the trailing portion. The other regions on the disc do not currently appear particularly complex, although the regions near the east limb are still difficult to assess due to the foreshortening here.

No Earth directed Coronal Mass Ejections (CMEs) have been seen in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds showed background conditions. Wind speeds varied between 280-350 km/s. Interplanetary Magnetic Field was weak, with the north-south component also varying weakly. Geomagnetic activity was Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was near or just very slightly above normal background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate solar activity is forecast, with isolated M-flares considered likely and a slight chance of X-flares.

Solar Wind / Geomagnetic Activity: There are two main CMEs in the forecast at present. The first is likely to arrive during Day 1 (23 Feb), with the second likely to reach Earth during Day 2 (24 Feb). Overall, confidence in the CME forecast remains low, however recent observations from Solar Orbiter suggest the second CME could be stronger than the first. Wind speeds are currently at background levels. Late Day 2 or Day 3 (24-25 Feb) a weak coronal hole fast wind may occur, with wind speeds perhaps reaching around 400-450 km/s.

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Geomagnetic activity is forecast to be mainly Quiet to Unsettled, but activity may increase to give a chance of G1/Minor Storm (Kp5) and a slight chance of G2/Moderate Storm (Kp6) intervals on Day 1, this increasing further on Day 2 with G1 intervals likely and a slight chance of G3/Strong storm intervals. This is due to CME influence. Activity gradually reducing into Days 3-4.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to persist at background levels, but with a slight chance of increasing above the S1/Minor radiation storm threshold in response to any larger flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	60	30	5
Strong	G3	No	5	15	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	60	60	60
Very Active	R3-R5 (X Class)	No	10	10	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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